ONE-WAY OR TWO-WAY MOBILE OPERATION

Discussion

The Commissions rewrite of the specification of effective radiated power limits in and the proposal to modify the way height-power limits are determined is an excellent proposal. A study of this proposal shows that the basic power limits contained in §22.565(b) are no longer necessary and therefore should also be deleted. The 42 km (26 mi) and 31 km (19 mi) average contour distance limits for VHF and UHF channels, respectively, in §22.565(c), together with the maximum ERP limits of §22.565(a) provide a proper control for all stations. If a "perimeter" (non/interior) facility is at a significantly lower elevation, there is no reason why the facility should not be able to utilize higher power up to the maximum permitted in §22.565(a) for interior facilities. Accordingly, modifications to §22.565 are being proposed to reflect the proposal that the §22.565(c) 42 km (26 mi) VHF and 31 km (19 mi) UHF average contour distances, together with the §22.565(a) maximum ERP limits, control the ERP limits for perimeter (non/interior) facilities.

The proposed §22.567(a)(1)(iii) should be deleted. Determination of area of service gained when interference is accepted requires the concept of "C/I" and the determination of signal levels. These concepts are being removed from the rules by the proposal to replace the Carey F(50,50) and F(50,10) propagation curves with formulas for determining service and interfering contour distances. Accordingly, there is no engineering basis in

the revised rules for making an engineering showing under §22.567(a)(1)(iii).

§22.567(a)(3), §22.567(a)(4), §22.567(a)(5), and §22.567(a)(6) propose specific formulas for determining the VHF service contour distance, the VHF interfering contour distance, the UHF service contour distance, and the UHF interfering contour distance, respectively. We have studied these formulas and find that while the formulas reasonably well reproduces the present 37 dBu VHF service and interference contours and the 39 dBu UHF service and interference contours for facilities with ERP's < 500 watts and HAAT's < 500 ft, there are differences for greater ERP's and HAAT's. We believe, however, that there are many advantages that come from the use of a formula approach for determining service and interference contour distances. Accordingly, we are continuing to study what, if any, changes in the coefficient and exponents of the proposed formula might be made that would minimize the differences from the values presently determined using Carey curves. We anticipate filing the results of our findings in the Reply Comments. It is important that all parties explicitly recognize that the adoption of a formula approach for determining the VHF and UHF service and interference contour distance removes from the FCC Rules the concept of Signal Strength and the determination of interference via the calculation of a required minimum C/I ratio.

§22.567(a)(3), §22.567(a)(4), §22.567(a)(5), and §22.567(a)(6) do not have the 0.1 watt lower ERP limit that was proposed and adopted in the Cellular Second Report and Order, CC Docket

No. 90-6, adopted March 12, 1992. Accordingly, these sections should be modified to conform with the Cellular Proposal.

The proposed §22.567 does not clarify at how many points the VHF and UHF Service Contours should be determined. Accordingly, we are proposing to add paragraphs that specify that both the VHF and UHF Service Contours should be determined by the appropriate formula in each of the eight cardinal radial directions and that all values for directions between the eight cardinal radial directions should be determined by linear interpolation of the eight cardinal radial contour distances as a function of angle. This clarification is essential so that the determination of Service Contour Distances is uniquely specified in all possible directions. A unique all-direction determination of the Service Contour is essential in order to determine whether or not a proposed facility has an interference contour that overlaps and thus "interferes with" a facility entitled to protection. Moreover, determination of the Service Contour by the use of only the basic eight cardinal values permits the Service Contour Values to be stored as part of the basic station file. The specification of linear interpolation allows all persons using this information to generate the same contour that is entitled to protection.

The proposed §22.567 does not clarify at how many points the VHF and UHF Interference Contours should be determined. Accordingly, we are proposing to add paragraphs that specify that both the VHF and UHF Interference Contours should be determined by the appropriate formula in each of the eight cardinal radial

directions and as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not overlap the service contour of each facility entitled to be protected. This clarification is essential so that the determination of the Interfering Contour is uniquely specified when making an interference showing. Use of more than the basic eight cardinal radials is particularly useful to ensure that a proposed facility utilizing a highly directional antenna does not have an interfering contour that overlaps a protected facility. Use of just the interstation radial is not always sufficient as an antenna can often possess a significant amount of power several degrees from a sizeable null that may be pointed in the direction of a co-channel facility that is to be protected. Use of interfering contours with more than eight values presents no data problems as interference contour values are not proposed to be stored as part of the basic information defining a proposed facility. This information, however, is part of the interference showing in the application and thus is contained in the FCC station files. We have studied this problem and from our experience there is no standard number of additional radials that is applicable for all possible situations. This is a place where engineering judgement must be utilized. This should cause no problem since the responsibility is totally on the applicant and since the Commission is proposing that the applicant be held accountable for this accuracy in §22.147(a).

The proposed §22.589(a) needs to be clarified as to precisely

what stations must be considered in interference showings since the Service Contour is computed in only the eight cardinal directions. It is being proposed that linear interpolation be utilized to define the bounding radials for which an extended co-channel search is required.

The proposed §22.589(b) encompassment exhibit needs to be clarified concerning how many points are required to specify the interference contours. It is proposed that the interference contour of the operating co-channel base transmitters be determined in each of the eight cardinal radial directions by the formula and that linear interpolation be used for all other values. For the proposed facility being encompassed by the operating facilities, it is proposed that the interfering contour be determined by the formula in each of the eight cardinal radial directions and also in as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not extend beyond the composite interfering contour of the operating facilities. It is also being proposed that additional radials between the cardinal eight radials need not be utilized if the maximum ERP between two cardinal radials does not exceed the maximum ERP of the adjacent bounding cardinal radials by more than 3 dB. Again, this is a place for engineering judgement; the 3 dB cutoff is being proposed to minimize the number of situations where problems might arise.

A new §22.589(c) needs to be added concerning use of in-building radiation systems. The proposed paragraph is identical

to §22.537(g) for one-way paging operations.

§22.575 concerning use of mobile channel for control transmitter needs to be modified. We are proposing that all use of the mobile channel at fixed locations be on a secondary basis and that the mobile channel may control any Part 22 frequency. There is no need to restrict the mobile frequency to controlling only the paired base frequency. Such a restriction would be unnecessary, counterproductive, and totally contrary to the concepts of flexible usage. Base frequencies can be used as a fixed transmitter for control purposes to control other frequencies. Why not also the mobile frequency? The only difference is the ease of determining interference. We believe the proposal to make all fixed usage of the mobile channel secondary resolves this problem. Under this concept, the receive antennae of the neighboring system being protected must be located within the composite protected service area of their paired base frequency transmitter(s). If collocated with the base transmitter, the receiver may not have an AHAAT more than 10 m higher than the paired base transmitter. If not collocated with the base transmitter, the receiver may not have an AHAAT more than the closest paired base transmitter. These restrictions are to ensure that "protected" mobile receivers in nearby systems are located within their actual system and not just located so as to prevent nearby use of the mobile frequency on a fixed basis.

Several administrative/clerical matters need attention, particularly:

All metric distances and elevations need to be rounded to the nearest whole unit.

A clarification is needed that all interference showings can be either in tabular and/or graphical form.

Specific Rule Changes

Proposed §22.565 Transmitting power limits

Paragraph (b):

Delete the entire paragraph.

Paragraph (c):

Replace "41.8 kilometers (26 miles)" with "42 kilometers (26 miles)".

Replace "30.6 kilometers (19 miles)" with 31 kilometers (19 miles)".

Proposed §22.567 Technical channel assignment criteria

Paragraph (a)(1)(iii):

Delete the entire paragraph

Revise Paragraph (a)(3)(ii) to read as follows:

"The value used for p in the above formula must not be less than 0.1 watt or 27 dB below (1/500th of) the maximum ERP in any direction, whichever is more."

Add under Paragraph (a)(3) the following section (iii):

"(iii) The VHF Service Contour is determined by the above formula in each of the eight cardinal radial directions. All values for directions between the eight cardinal radial directions shall be determined by linear interpolation of the eight cardinal radial contour distances as a function of angle."

Add under Paragraph (a)(3) the following section (iv):

"(iv) All Service Contour distances shall be rounded out to the nearest kilometer."

Revise Paragraph (a)(4)(ii) to read as follows:

"The value used for p in the above formula must not be less than 0.1 watt or 27 dB below (1/500th of) the maximum ERP in any direction, whichever is more."

Add under Paragraph (a)(4) the following (iii):

"(iii) The VHF Interfering Contour is determined by the above formula in each of the eight cardinal radial directions and as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not overlap the service contour of each facility entitled to be protected."

Add under Paragraph (a)(4) the following section (iv):

"(iv) All Interfering Contour distances shall be rounded out to the nearest kilometer."

Revise Paragraph (a)(5)(ii) to read as follows:

"The value used for p in the above formula must not be less than 0.1 watt or 27 dB below (1/500th of) the maximum ERP in any direction, whichever is more."

Add under Paragraph (a)(5) the following section (iii):

"(iii) The UHF Service Contour is determined by the above formula in each of the eight cardinal radial directions. All values for directions between the eight cardinal radial directions shall be determined by linear interpolation of the eight cardinal radial contour distances as a function of angle."

Add under Paragraph (a)(5) the following section (iv):

"(iv) All Service Contour distances shall be rounded out to the nearest kilometer."

Revise Paragraph (a)(6)(ii) to read as follows:

"The value used for p in the above formula must not be less than 0.1 watt or 27 dB below (1/500th of) the maximum ERP in any direction, whichever is more."

Add under Paragraph (a)(6) the following (iii):

"(iii) The UHF Interfering Contour is determined by the above formula in each of the eight cardinal radial directions and as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not overlap the service contour of each facility entitled to be protected."

Add under Paragraph (a)(6) the following section (iv):

"(iv) All Interfering Contour distances shall be rounded out to the nearest kilometer."

Add a new Paragraph (c) as follows:

(c) In-building radiation systems. Licensees may install and operate in-building radiation systems without applying for authorization or notifying the Commission. In-building radiation systems operated under this paragraph may provide only public mobile service. The locations of in-building radiation systems must be within the service contour(s) of the licensee's authorized transmitter(s) on the same channel. In-building radiation systems are not protected facilities, and therefore do not have service or interfering contours.

Proposed §22.589 One-way or two-way application requirements

Add the following to the end of the initial paragraph:

"The supplemental information described in this section may be supplied either in tabular and/or graphical forms."

Add the following paragraph under (a)(1):

"(i) The radials that bound the extended search shall be determined as follows. Between a cardinal radial in which the distance to the interference contour is equal to or less than 76 km (47 mi) and a cardinal radial in which the distance to the interference contour exceeds 76 km (47 mi), linear interpolation of distance versus angle will be used to determine the bounding radial direction that correlates with the 76 km (47 mi) interference contour distance."

Add the following Paragraph under (a)(2):

"(i) The radials that bound the extended search shall be determined as follows. Between a cardinal radial in which the distance to the interference contour is equal to or less than 93 km (58 mi) and a cardinal radial in which the distance to the interference contour exceeds 93 km (58 mi), linear interpolation of distance versus angle will be used to determine the bounding radial direction that correlates with the 93 km (58 mi) interference contour distance."

Add to Paragraph (a)(3) the following:

"The Service Contour of each facility to be protected is determined by the formulas in §22.567, Paragraphs (a)(3) and (a)(5) in each of the eight cardinal radial

directions. These determinations shall use the HAAT and ERP values stated in FCC application defining each station entitled to be protected. All values for directions between the eight cardinal radial directions shall be determined by linear interpolation of the eight cardinal radial contour distances. The Interfering Contour of the proposed facility shall be determined by the formula in §22.567, Paragraphs (a)(4) and (a)(6), in each of the eight cardinal radial directions and also in as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not overlap the service contour of each facility entitled to be protected."

Add to Paragraph (b) the following:

"The interfering contours of operating co-channel base transmitters shall be determined in each of the eight cardinal radial directions by the formula in §22.567, Paragraphs (a)(4) and (a)(6), in each of the eight cardinal radial directions. These determinations shall use the HAAT and ERP values stated in the FCC application defining each station being utilized. All values for directions between the eight cardinal radial directions shall be determined by linear interpolation of the eight cardinal radial interfering contour distances. The Interfering Contour of the proposed facility being encompassed by the operating facilities shall be determined by the formula in §22.567, Paragraphs (a)(4) and (a)(6), in each of the eight cardinal radial directions and also in as many additional directions as may be necessary to demonstrate that the interfering contour of the proposed facility does not extend beyond the interfering contour of the operating facilities. Additional radials between the cardinal eight radials need not be utilized if the maximum ERP does not exceed the maximum ERP of the adjacent bounding cardinal radials by more than 3 dB."

Proposed §22.575 Use of mobile channel for control transmitter

Revise the initial paragraph to read as follows:

"Carriers may be authorized to control base transmitters on any Part 22 frequency using a control transmitter on a mobile channel to which they hold an authorization for the paired base frequency, subject to the provisions of this section. Control transmitters authorized pursuant to the provisions of this section do not have to meet the requirements of §22.567(b). All fixed usage of the mobile transmitter shall be on a secondary basis so as

not to disrupt the operations of neighboring co-channel facilities entitled to protection."

Add Paragraph (e) to read as follows:

"(e) The receive antennae of neighboring systems entitled to protection on a secondary basis must be located within the composite protected service area of their paired base transmitter(s). If collocated with the base transmitter, the receiver may not have an AHAAT more than 10 m higher than the paired base transmitter. If not collocated with the base transmitter, the receiver may not have an AHAAT more than the closest paired base transmitter."

Subpart H-Cellular Radiotelephone Service

Discussion

The proposed §22.911(a)(4) does not have the 0.1 watt lower ERP limit that was proposed and adopted in the Cellular Second Report and Order, CC Docket No. 90-6, adopted March 12, 1992. Accordingly, this section should be modified to conform to the original Cellular Proposal.

As for Paging and Two-Way Operations, §22.911(a) should have a section added to clarify that the service area boundary is determined by the formula specified in each of the eight cardinal radial directions and that all values for directions between the eight cardinal radial directions shall be determined by linear interpolation of the eight cardinal radial service area distances. This methodology was contained in a footnote in the Cellular Second Report and Order; it should explicitly be made a part of the Rules.

§22.930(d)(1) from the Cellular Second Report and Order regarding de minimis extensions has been omitted. This paragraph needs to be included in the proposed §22.912. Without this paragraph, an unjust engineering design burden would be placed on those licensees which are in the initial stages of designing their systems. Without this paragraph, the only permissible extensions would be "Contract Extensions".

§22.913(b) should be modified to exclude from the height-power limit any facility where coordination is performed with all systems within 121 km (75 mi), provided that the service area boundary of

the cell does not extend into the CGSA of any other licensee's cellular system on the same frequency block or into the unserved area in any adjacent MSA or RSA where the five year fill-in period has expired. Likewise, the height-power limit should not apply to those facilities operated pursuant to contract extensions.

§22.163 and §22.165 need additional clarification to ensure that Schedule B engineering information is always filed whenever any engineering changes are made to any perimeter cell. This is essential to ensure that current engineering information is on file at the FCC or all perimeter cells for each MSA/RSA cellular system.

Several administrative/clerical matters need attention, particularly:

> All metric distances and elevations need to be rounded to the nearest whole unit.

Specific Rule Changes

Proposed §22.911 Cellular geographic service area

Revise Paragraph (a)(4) to read as follows:

> "The value used for p in the above formula must not be less than 0.1 watt or 27 dB below (1/500th of) the maximum ERP in any direction, whichever is more."

Add under Paragraph (a) the following section (5):

> "(5) All Service Area Boundary Distances shall be rounded out to the nearest kilometer."

Add under Paragraph (a) the following section (6):

> "(5) The service area boundary is determined by the above formula in each of the eight cardinal radial directions. All values for directions between the eight cardinal radial directions shall be determined by linear

interpolation of the eight cardinal radial service area distances."

Proposed §22.912 Service area boundary extensions

Add the following Paragraph (c):

"(c) De minimis extensions. Service area boundaries may extend into adjacent MSAs or RSAs if such extensions are de minimis and are demonstrably unavoidable for technical reasons of sound engineering design."

Proposed §22.913 Effective radiated power limits

Paragraph (b):

Replace "41.5 kilometers (26 miles) with "42 kilometers (26 miles)".

Add to Paragraph (b) additional language to accomplish the following:

Exclude from the height-power limit any facility where coordination is performed with all systems within 121 km (75 mi), provided that the service area boundary of the cell does not extend into the CGSA of any other licensee's cellular system on the same frequency block or into the unserved area in any adjacent MSA or RSA where the five year fill-in period has expired. Likewise, the height-power limit should not apply to those facilities operated pursuant to contract extensions.

Proposed §22.163 & §22.165

Add to these sections additional language to accomplish the following:

Ensure that Schedule B engineering information is always filed whenever any engineering changes are made to any perimeter cell for each MSA/RSA cellular system.

FORM 401

The following items need to be considered in finalizing the new Form 401:

A box must be added by each set of coordinates to specify whether the coordinates were determined under NAD27 or under NAD83.

It is insufficient to describe a facilities coverage by only specifying the ERP in the cardinal eight radial directions; the average terrain elevation in each radial direction must also be specified. Also, the Antenna Radiation Center Height above ground level should also be specified. This information is essential to provide for an easy and repeatable determination of contour distances; without this essential information being specified, each party desiring to calculate the service contour will first have to determine the radiation center height above ground and the average terrain elevation in each radial direction. These determinations will invariably differ, although often by relatively small amounts. These differences will lead to differences in service contour distances and thus to needless claims of interference from small contour overlaps. This would significantly undermine the Commission's purpose in adopting formulas. It is not enough to adopt formulas; <u>all</u> information utilized in the formulas must be specified in each Form 401 application.

The method of determining average terrain elevations must be specified. If digital information was utilized, the specific file must be specified.

CONCLUSION

A variety of technical and engineering matters in the Proposed Part 22 Rewrite have been considered. A number of specific proposals have been made along with the technical reasons why they should be adopted.